Aggregate Technician

2022

Proficiency Pack

Date: _____

Name: _____

Employer: _____

AASHTO R90: Sampling of Aggregates
PROFICIENCY CHECKLIST
Revised on 08/31/2020

Applicant: _____

For all QC/QA or Acceptance sampling, record the time or location or both.

Conveyor Belt Sampling – Sampling Device – Coarse/Mixed Aggregate NOTE: Automatic belt samplers may be used if properly maintained and inspected.	Trial 1	Trial 2
1. Plant was operating at the usual rate.		
2. Random samples taken from a conveyor belt discharge taken from production. (avoid beg. or end)		
3. Sample taken from entire cross-section once in each direction without overflowing the device.		
4. Included all material from the sampling device into an clean empty container.		
5. Obtained 1 or more increments to form a field sample.		
Conveyor Belt Sampling – Template - Coarse/Mixed Aggregate		
1. Conveyor belt stopped, locked and tagged out.		
2. Random samples taken from production.		
- Avoided sampling at the beginning or end of a run		
3. Template placed on the belt to yield one increment.		
4. All material inside the template scooped into a proper container including fines.		
5. Obtained 1 or more increments to combine for a field sample.		
Stockpile Sampling – Flat Board – Coarse/Mixed Aggregate		
1. Created a horizontal surface with a vertical face.		
2. Inserted board vertically against a vertical face to prevent sloughing.		
3. Discarded sloughed material.		
4. Obtained a sample from the horizontal surface close to the vertical face.		
5. Obtained at least one increment from; the top third, the middle third, and the bottom third of the stockpile.		
6. Combined to form a field sample.		
Stockpile Sampling - Sampling Tube - Fine Aggregate Only		
1. The outer layer of the stockpile removed.		
2. Obtained a minimum of 5 random tube insertions on the stockpile.		
3. Combined to form a field sample.		
Stockpile Sampling – Loader – Coarse/Mixed Aggregate		
1. Segregation avoided by re-blending the pile.		
2. Loader entered the pile with bucket at least 1 foot above the ground.		
3. Discarded first bucketful.		
4. Re-entered stockpile to obtain a full loader bucket of material		
5. Bucket tilted just enough for free flow, created small sampling pile. (Can go back for more).		
6. Back dragged the small pile to form a sampling pad.		
7. Randomly collected a min. of 3 increments with a shovel at least 1 foot from sample pile edge.		
8. Inserted the shovel excluded underlying material, placed in a clean dry container		
9. Combined increments to form a field sample.		
Roadway Base Sampling – In-Place – Coarse/Mixed Aggregate		
1. Obtained at least 1 increment, using random number set for a QC/QA sample before compaction.		
2. If not a QC/QA sample, obtained at least 1 or more random increments for a field sample.		
3. Used a square nose shovel and or a metal template to mark the area.		
4. Shoveled the full depth of the material excluding underlying material.		
5. Combined increments to form a field sample.		
	PASS	**PASS**
	FAIL	**FAIL**

Examiner: _____ Date: _____

AASHTO R76: Reducing Field Samples of Aggregate to Testing Size
PROFICIENCY CHECKLIST

Revised on 10/14/2020

Applicant: _____

Trial #	1	2
Method A – Splitting		
(8 chutes for Coarse CA, 12 chutes for Fine FA)		
1. Material in an air-dried condition.		
2. Adjusted the openings to be 50% larger than the largest particle.		
3. Material spread uniformly on feeder from edge to edge.		
4. Rate of feed slow enough so that sample flows freely through chutes.		
5. Material in one receptacle re-split until desired weight was obtained.		

Method B - Quartering		
1. Moist sample placed on clean, hard, level surface.		
2. Mixed by turning over at least 3 times with shovel.		
3. Conical pile formed.		
4. Pile flattened to uniform thickness and diameter of 4-8 times thickness		
5. Divided into 4 equal portions with shovel or trowel.		
6. Removed two diagonally opposite quarters, including all fines.		
7. Remaining quarters, mixed and quartered until reduced to desired sample size.		
NOTE: The sample may be placed upon a canvas quartering cloth and a stick or pipe may be placed under the tarp to divide the pile into quarters.		

Method C – Miniature Stockpile (Damp Fine Aggregate Only)		
1. Moist fine aggregate sample placed on clean, hard, level surface.		
2. Material thoroughly mixed by turning over three times.		
3. Small stockpile formed.		
4. Obtain at least 5 samples taken at random with sampling thief, small scoop, or spoon, combined to attain appropriate sample size		

	PASS	PASS
	FAIL	FAIL

Examiner: _____ Date: _____

AASHTO T 255: Total Evaporable Moisture Content of Aggregate by Drying
PROFICIENCY CHECKLIST
Revised on 12/06/2019

Applicant: _____

Employer: _____

Trial #	1	2
1. Representative test sample secured		
2. Test sample mass conforms to following from the T255 AASHTO Table:		
3. Mass determined to the nearest 0.1%		
4. Loss of moisture avoided prior to determining the mass		
5. Sample dried by a suitable heat source		
6. If heated by means other than a controlled temperature oven, is sample stirred to avoid localized overheating		
7. Sample dried to constant mass and mass determined to nearest 0.1%		
8. Moisture content calculated by: $\%\ \text{moisture} = \frac{\text{wet sample mass - dried sample mass}}{\text{dried sample mass}} \times 100$		

Nominal Maximum Size of Aggregate in. (mm)	Minimum Sample Mass Lbs. (g.)
#4 (4.75)	1.1 (500)
⅜" (9.5)	3.3 (1,500)
½" (12.5)	4.4 (2,000)
¾" (19.0)	6.6 (3,000)
1" (25.0)	8.8 (4,000)
1 ½" (37.5)	13.2 (6,000)

PASS PASS

FAIL FAIL

Examiner: _____ Date:_____

AASHTO T11: Materials Finer Than No. 200 by Washing
PROFICIENCY CHECKLIST

Revised on 10/14/2020

Applicant: _____

Trial #	1	2
1. Test sample dried to constant mass at 230 ± 9°F (110 ± 5°C).		
2. Test sample allowed to cool, and mass determined to 0.1%.		
3. #200 sieve checked for damage. Cover the #200 with a #8 or #16 sieve.		
4. Sample placed in a container and covered with water.		
5. Wetting agent added. (optional)		
6. Sample and contents of container vigorously agitated. Note: Mechanical washers maximum time is 10 min of washing.		
7. Wash water poured through the sieve nest.		
8. Wash water free of coarse particles.		
9. Operation continued until wash water is clear.		
10. Material on sieves returned to washed sample.		
11. Excess water decanted from washed sample only through the #200 sieve.		
12. Washed aggregate dried to constant mass at 230 ± 9°F (110 ± 5°C).		
13. Washed aggregate mass cooled and determined to 0.1%.		
14. Calculation: % less than #200 = $\frac{\text{Orig.dry mass} - \text{Final dry mass}}{\text{Orig. dry mass}}$ x 100		
	PASS	PASS
	FAIL	FAIL

Examiner: _____ Date: _____

AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregate

PROFICIENCY CHECKLIST

Revised on 12/06/2019

Applicant: _____

Trial#	1	2
Fine Aggregate		
1. Reduce per AASHTO R76		
2. Minimum sample mass 500 g		
Coarse Aggregate		
1. Reduce per AASHTO R76 used sample size determined from nominal maximum aggregate size, and MoDOT' s EPG chart		
2. Sample dried to constant mass at 230 ± 9°F (110 ± 5°C), weighed to nearest 0.1% and recorded		
- AASHTO T11 may be performed at this point, washing material finer than No. 200 sieve, dried to a constant mass at 230 ± 9°F (110 ± 5°C), weight recorded, and weight loss calculated to nearest whole number		
3. Stacked appropriate sieves in descending order		
4. Poured sample in the top sieve without losing material		
5. Agitated **Manually** or **Mechanically**		
- **Manual Sieving** continued until not more than 0.5% by mass of the total sample passes a given sieve during 1 minute of continuous hand sieving		
- **Mechanical Sieving** Verified annually - Timer verified/calibrated for sieving thoroughness. (Established by trial or checked by measurement on the actual test sample to meet the 0.5% criteria as in hand sieving above. (Records kept in the lab) - Set at verified/calibrated time approximately 7-10 min. - Or if timer not verified/calibrated, hand sieved afterwards for sieving accuracy		
6. Precautions taken to not overload sieves		
7. Weighed material in each sieve either by **Non-cumulative** or **Cumulative** method		
8. Total mass of material after sieving agrees with mass before sieving to within 1 gram per sieve used (If not, do not use for acceptance testing)		
9. Percentages calculated to nearest 0.1% and reported to nearest whole number		
10. Percentage calculations based on original dry sample mass, including the passing No. 200 fraction if T 11 was used		
	PASS	PASS
	FAIL	FAIL

Examiner: _____ Date: _____

AASHTO TM71: Deleterious Content of Aggregate
PROFICIENCY CHECKLIST

Revised on 12/06/2019

Applicant: _____

Trial #	1	2
1. Material tested in an as received condition (may be dried at 140°F)		
2. Reduce the sample according to the Maximum Size aggregate using the TM71 table below: Note: Surplus this amount for sieving		
Maximum Size Inches (mm) / **Minimum Sample Size of +4 material**: 2 (50) — 10,000 grams; 1½ (37.5) — 9,000 grams; 1 (25.0) — 5,000 grams; ¾ (19.0) — 3,000 grams; ½ (12.5) — 2,000 grams; ⅜ (9.5) — 1,000 grams. Maximum size is defined as the smallest sieve through which 100% of the material will pass.		
3. Sieve the reduced sample over a #4 sieve and discard the passing material		
4. Reweigh the +4 material to see if the sample meets the minimum size needed from the table.		
5. Record the weight of the plus #4 material as the Original Mass		
6. Set-up a workstation with a good light, a pan or spray bottle of water and several sorting pans		
7. Obtain a handful, briefly wet a few particles and visually examine each particle **(Do not soak the particles in water)**		
8. Examine each piece and separate the deleterious particles into specific groups according to specifications: (OFM, Hard Chert, Soft chert, Shale, etc.)		
9. Record the weight of each group of deleterious found in the sample to the nearest whole gram		
NOTES: ❖ Groups are defined in the test method and will vary based on product type as well as the presence of any given group ❖ For 1002 material, keep soft chert separate as it will be included in both deleterious and hard chert		
10. Calculate the percentage of each group identified, report to nearest 0.1% for each category $P = \frac{C}{W} \times 100$ Where: P = Percentage of each deleterious component C = Actual weight (mass) of deleterious for each group W = Weight (mass) of test sample for the portion retained on the #4 sieve		
	PASS	PASS
	FAIL	FAIL

Examiner: _____ Date: _____

ASTM D 4791: Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
PROFICIENCY CHECKLIST

Revised on 12/06/2019

Applicant: _____

<table>
<tr><td>Sample Preparation Trial #</td><td>1</td><td>2</td></tr>
<tr><td>1. Sample in accordance with AASHTO R90</td><td></td><td></td></tr>
<tr><td>2. Determine the Nominal Maximum size of the aggregate sample</td><td></td><td></td></tr>
<tr><td>3. Reduce the sample using AASHTO R76 to the testing size using the Table below
<table>
<tr><th>Nominal Maximum Size
in. (mm)</th><th>Minimum Mass
lb. (g,)</th></tr>
<tr><td>⅜ (9.5)</td><td>2 (1000)</td></tr>
<tr><td>½ (12.5)</td><td>4 (2000)</td></tr>
<tr><td>¾ (19.0)</td><td>11 (5000)</td></tr>
<tr><td>1 (25.0)</td><td>22 (10,000)</td></tr>
<tr><td>1 ½ (37.5)</td><td>33 (15,000)</td></tr>
<tr><td>2 (50)</td><td>44 (20,000)</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>4. Determine to test either by Count or Mass</td><td></td><td></td></tr>
<tr><td>5. For Mass, sample oven-dried to constant mass at 230 ± 9°F (110 ± 5°C)
For Count, sample is tested in an as is condition</td><td></td><td></td></tr>
<tr><td>6. Sieve analysis completed according to AASHTO T27, record the mass retained of each fraction in column A of the report</td><td></td><td></td></tr>
<tr><td>7. Obtained the fractions needed to test per Count or Mass:
By Particle Count: From the Sieve Analysis each fraction from the #4 or 3/4” sieve and above as required by specification, with a minimum of 10% retained will be reduced to approximately 100 particles

By Mass: Use the material retained on the #4 or 3/4” sieve and above as required by MoDOT EPG specifications 1002, 1005, etc.</td><td></td><td></td></tr>
<tr><td>Procedure: Method B - Flat and Elongated Particle Test</td><td></td><td></td></tr>
<tr><td>1. Sort each particle in each size fraction into one of two groups:
(1) Flat and elongated OR (2) Not flat and elongated</td><td></td><td></td></tr>
<tr><td>2. Proportional caliper device positioned at the proper ratio 5:1 or 3:1</td><td></td><td></td></tr>
<tr><td>3. Test each particle in the caliper by setting the larger opening to the particle length</td><td></td><td></td></tr>
<tr><td>4. Then place the particle through the opposite side of the caliper for thickness, if it slips through the smaller measure, the particle is flat and elongated</td><td></td><td></td></tr>
<tr><td>5. Weigh the amount of F&E of each fraction and record each to the nearest whole number on the report</td><td></td><td></td></tr>
<tr><td>Calculations</td><td></td><td></td></tr>
<tr><td>Percentage of flat and elongated particles calculated to nearest 1% for each sieve size as required</td><td></td><td></td></tr>
<tr><td></td><td>PASS</td><td>PASS</td></tr>
<tr><td></td><td>FAIL</td><td>FAIL</td></tr>
</table>

Examiner: _____Date:_____

AASHTO T 85: Specific Gravity and Absorption Of Coarse Aggregate

PROFICIENCY CHECKLIST

Revised on: 09/21/2021

Applicant: _____

Procedure Trial#	1	2
1. Sample obtained by ASHTO R90, and Reduced per AASHTO R76		
2. Screened on No. 4 sieve (4.75mm) or No. 8 (2.36mm) sieve		
3. Sample mass as follows: ½ in. or less – 2 kg; ¾ in. – 3 kg; 1 in. – 4 kg; 1 ½ in. – 5kg		
4. Washed to clean surfaces of particles		
5. Dried to constant mass at 230 ± 9°F (110 ± 5°C) and cooled to room temperature for 1 to 3 hours (for up to 1 ½ in. nominal maximum size, longer for larger sizes) According to AASHTO T255.		
6. Covered with water for 15 to 19 hours		
7. Prepared bath, overflowed the water for level, and adjusted temperature to 73.4 ± 3°F (23.0 ± 1.7°C)		
8. Rolled in cloth to remove visible films of water		
9. Larger particles wiped individually		
10. Evaporation avoided		
11. Weigh the SSD sample and Record all masses determined to the nearest 1g or 0.1% of sample mass.		
12. Sample immediately placed in the wire basket		
13. Entrapped air removed before weighing by shaking the wire basket while immersed.		
14. Mass determined in water at 73.4 ± 3°F (23.0 ± 1.7°C)		
15. Dried to constant mass at 230 ± 9°F (110 ± 5°C) and cooled to room temperature for 1 to 3 hours [or until aggregate has cooled to comfortable handling temperature, approximately 122°F (50°C)]		
16. Weigh the dry sample and record the mass		
17. Calculated the Bulk Specific Gravity and Absorption. **Report:** Specific Gravity for Asphalt (1002) to the nearest: **0.001** Concrete (1005) and M80 to the nearest: **0.01** And Absorption to the nearest: **0.1%**		
	PASS	PASS
	FAIL	FAIL

Examiner: _____Date:_____

AASHTO T 84: Specific Gravity for Fine Aggregate

PROFICIENCY CHECKLIST

(rev 12/16/2019)

Applicant: _____

. Trial #	1	2
Sample Preparation		
1. Obtain a representative sample. (AASHTO R90)		
2 Mix and Reduce. (AASHTO R76)		
3. Sieved over #4 sieve , keep minus 4 material (approximately 1,000 g)		
4. Dried to constant mass at 230 ± 9°F (110 ± 5°C) **Note:** Oven drying not necessary if naturally moist condition is desired **Note:** See Provisional Tests 1-4 for materials that do not readily slump found in appendix		
5. Sample is covered with water, allowed to stand 15-19 hours		
6. Pycnometer calibrated at 73.4 ± 3ºF record this weight to nearest 0.1g (This is "**B**" in the equation)		
7. After 15-19hrs, decant the excess water off the sample without loss of fines		
8. Calibrated pycnometer partially filled with water, set by the scale		
STEPS 9-15 is the CONE TEST		
9. Sample spread on a flat nonabsorbent surface		
10. Sample uniformly dried by a current of warm air		
11. Mold placed on flat nonabsorbent surface and filled to overflowing		
12. Tamped 25 times with 5 mm drop, and allowed to fall freely		
13. Sample removed from around base and mold lifted vertically		
14. Sample should retain the shape of the cone on first trial. If slumps on the first trial, water added, sample covered and allowed to stand for 30min….then back to cone testing.		
15. Drying continued, and slump test repeated at frequent intervals until sample slumps slightly = SSD Condition		
16. Immediately weighed 500±10g of the SSD sample to the partially filled pycnometer. (Report the mass to nearest 0.01 this is "**S**" in the equation)		
17. Pycnometer filled to 90% of total capacity and agitated to eliminate air bubbles. **Note:** Paper towel or isopropyl alcohol may be used to disperse foam on the water surface		
18. Pycnometer filled with water to the calibrated capacity line.		
19. When temperature of contents reach 73.4 ± 3°F (23.0 ± 1.7°C), towel dried the outside of the pycnometer and determined the total mass of the pycnometer, sample, and water to the nearest 0.1g (Report this as "**C"** in the equation)		
20. Sample removed from the pycnometer, placed in a pre-weighed pan and dried to constant mass at 230 ± 9°F (110 ± 5°C)		
21. Sample cooled in air at room temperature for 1.0 ± 0.5 hr. and dry mass determined to the nearest 0.1g, this is "**A**" in the equation.		
22. Calculations completed as needed: **Report:** Specific Gravity for Asphalt (1002) to the nearest: **0.001** Specific Gravity for Concrete (1005) and M6 to the nearest: **0.01** And Absorptions Report to the nearest: **0.1%**		

PASS PASS

FAIL FAIL

Examiner: _____ Date: _____